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(56) Documents Cited

**GB 2236476 A GB 1362490 A WO 93/18318 A**  
**US 4600239 A**

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(54) Abstract Title

**Variable position vehicle seat**

(57) A vehicle with a variable position seat 6, employs an eccentric or crank gear mounting of the seat to permit radial and diametral variation of the position of the seat. The mounting comprises a first axle pin 12, connected to the vehicle floor 5, a second axle pin connected to the base 8 of the seat and a pivot arm 14 rotatably coupled to and joining the two pins. Two intermeshing gear segments 11 and 10, fixed to the pins cause a predetermined rotation of the seat about the associated axle pin, when the pivot arm is rotated about the floor mounted axle pin. A brake means 16 mounted on the pivot arm acts on brake disc 15 to slow this rotation. Also disclosed is the use of two or more gear transmissions, connected in series to allow rotation of the seat past the limiting angle imposed by the above mechanism.

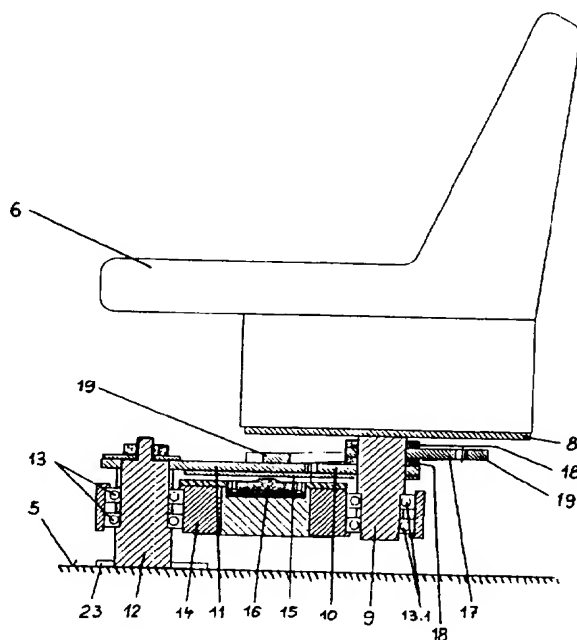


Fig. 2

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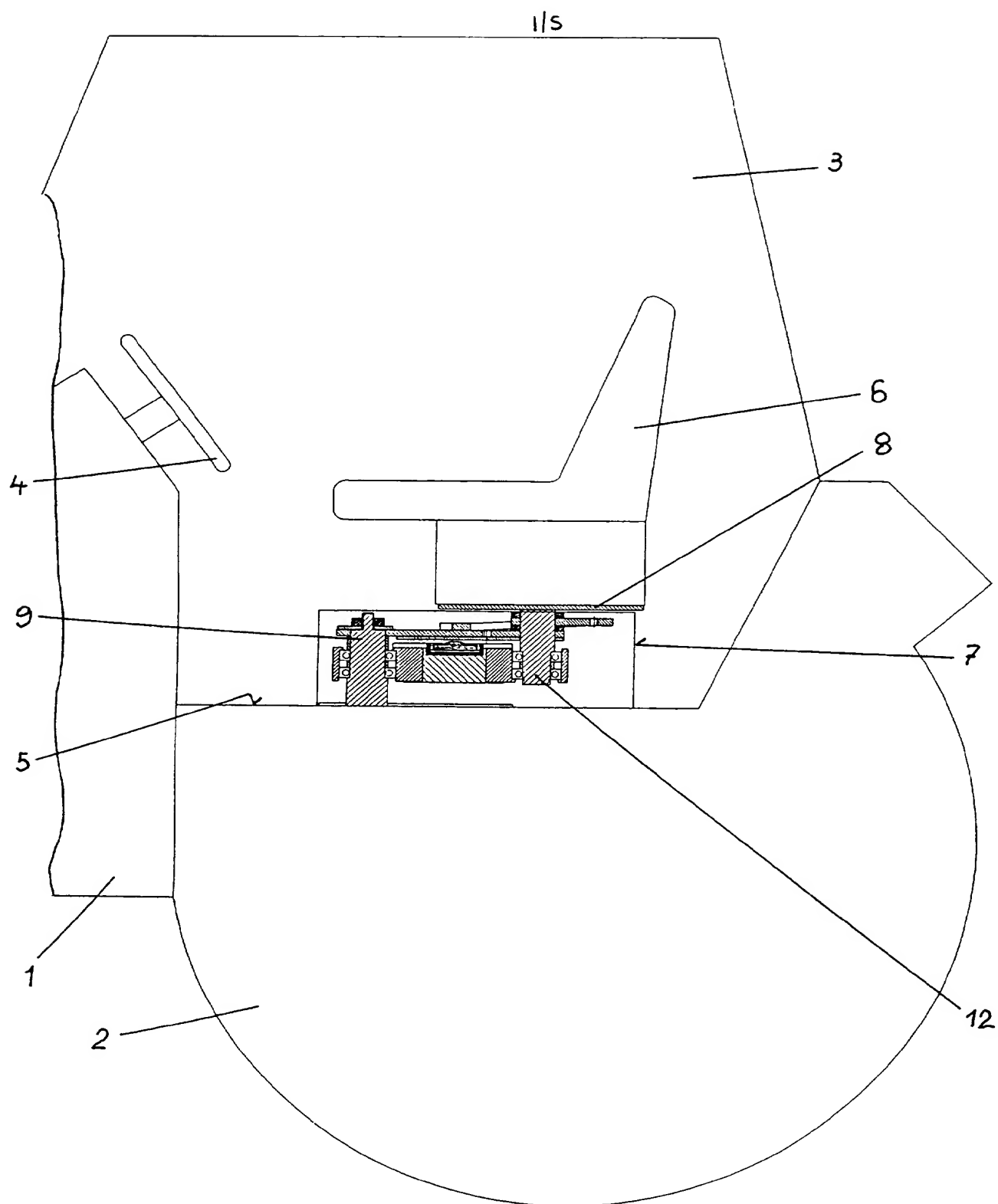
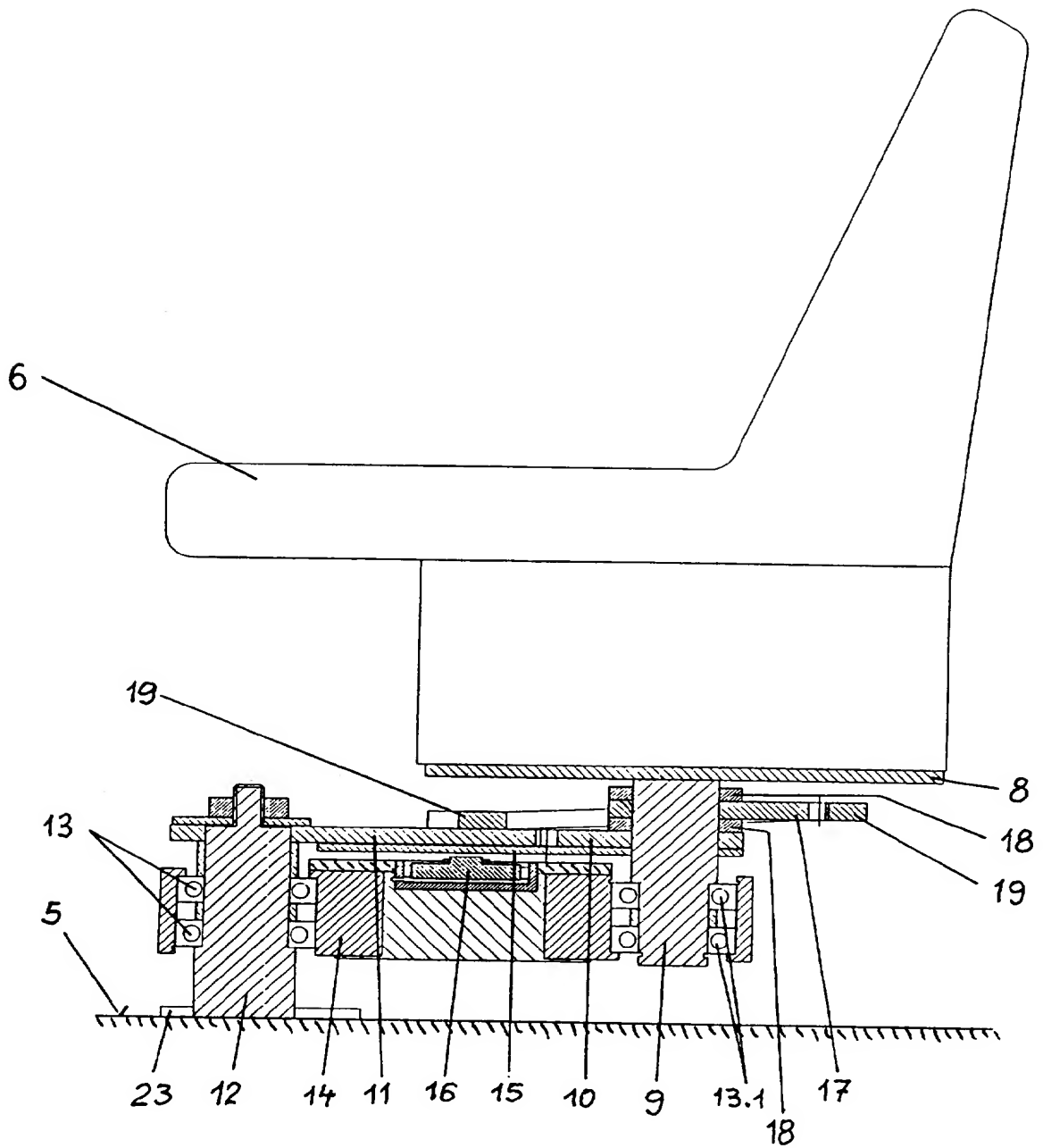


Fig. 1

Fig. 2

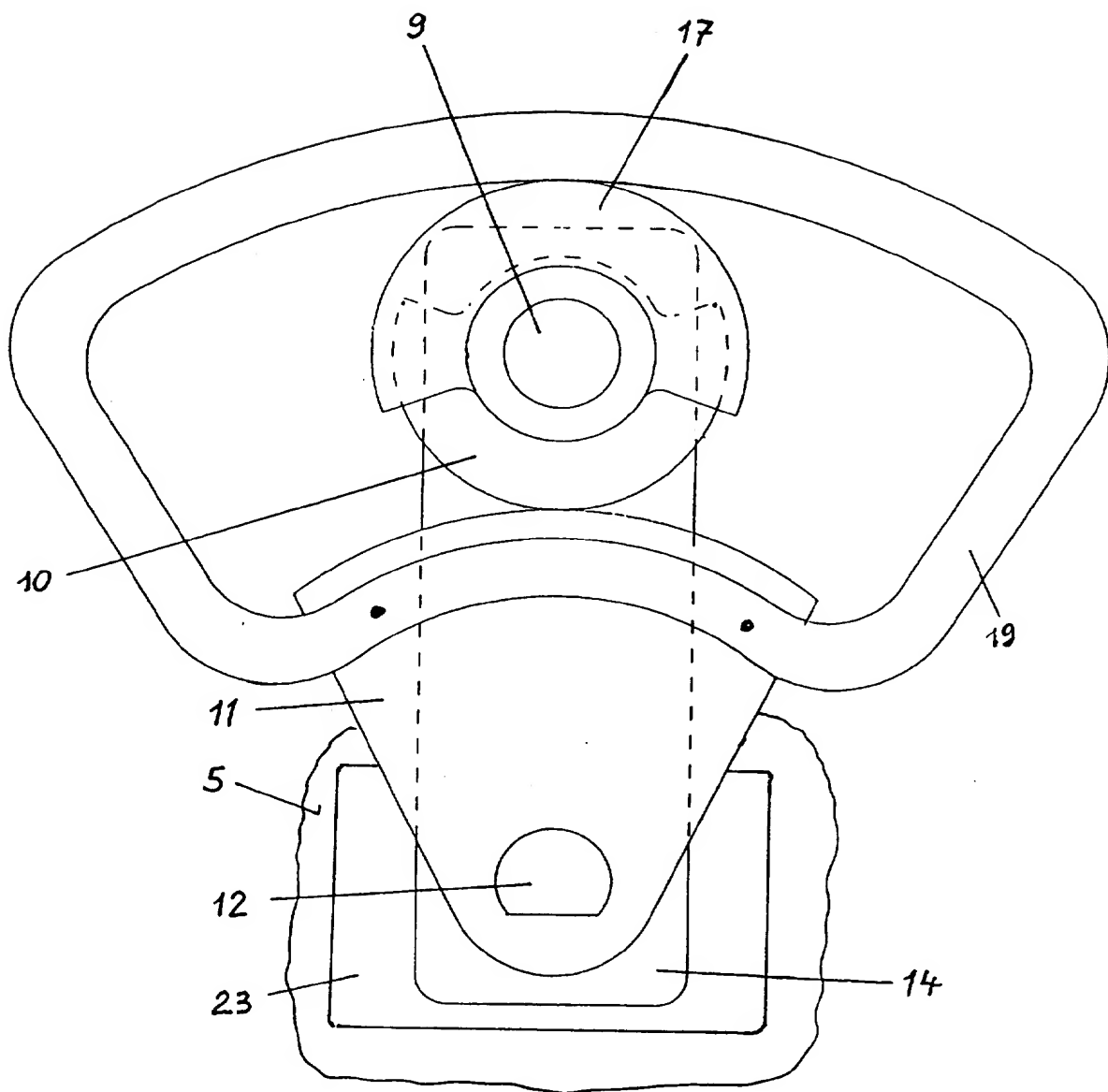


Fig. 3

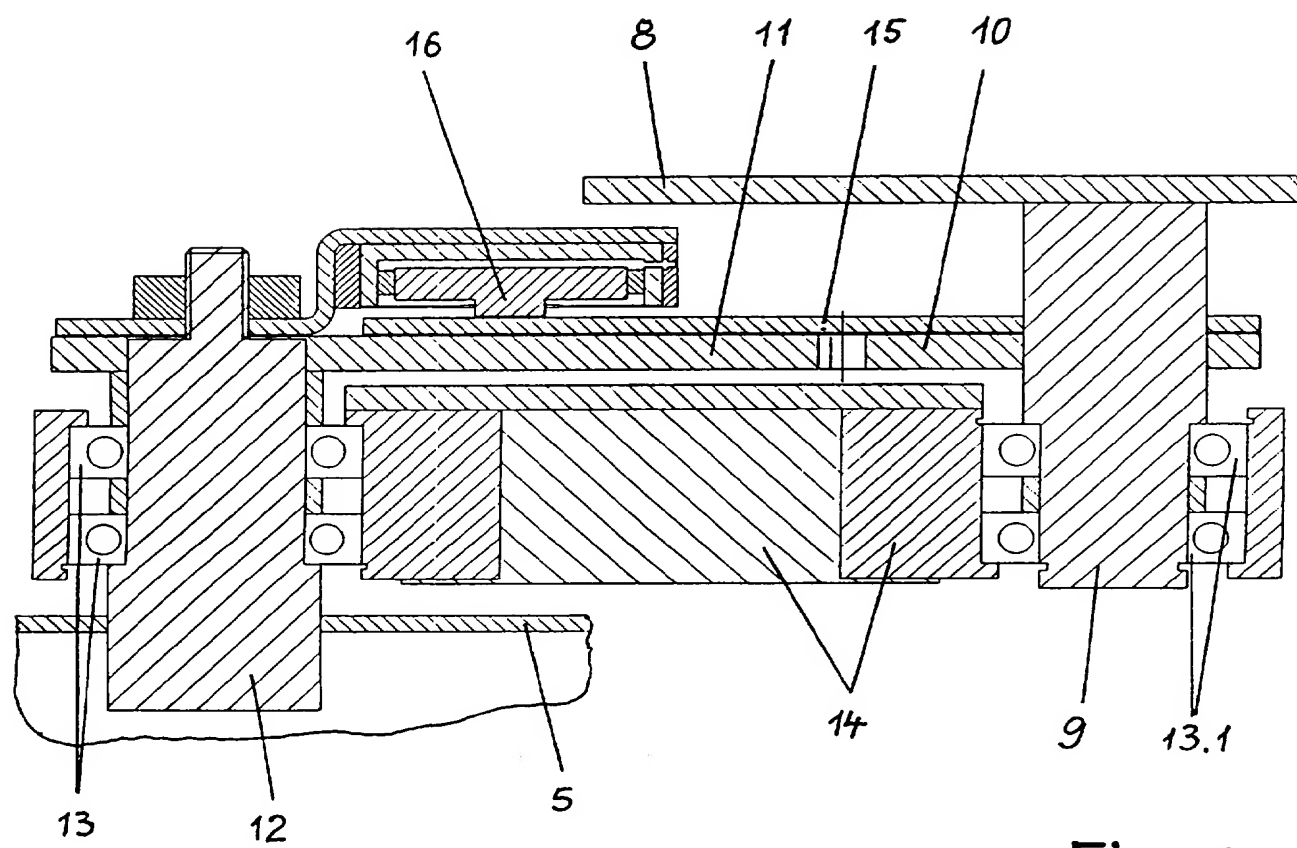


Fig. 4

S/S

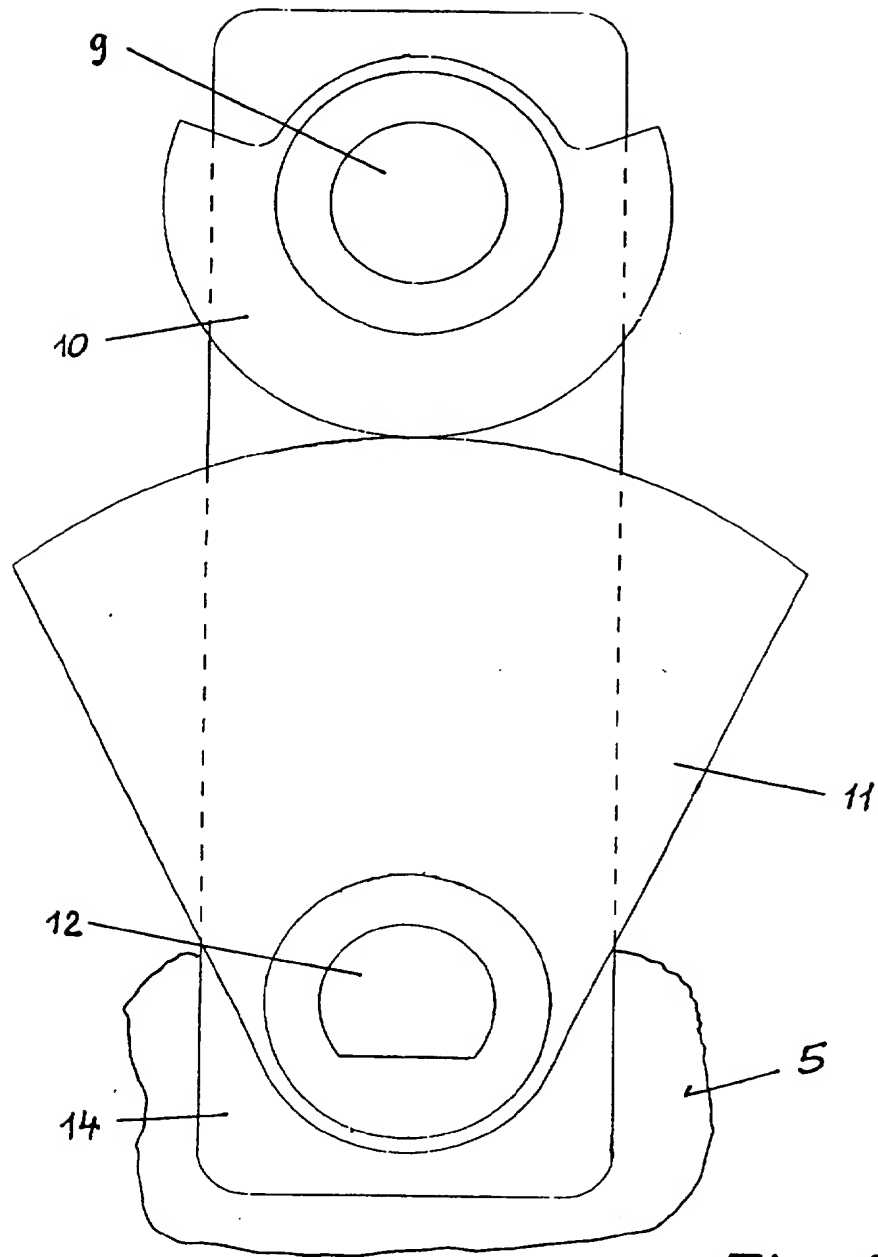


Fig. 5

VARIABLE POSITION VEHICLE SEAT

The present invention relates to a vehicle with a variable position seat, especially a seat capable of diametral and simultaneous radial variation in position and particularly a driver seat of the vehicle.

In the case of certain categories of vehicle, for example commercial vehicles, towing vehicles, tractors, graders, excavators, loaders, rescue vehicles, buses, particularly commuter or town buses and school buses, water vehicles, rail vehicles and air vehicles, to name but a few, it is frequently required that for convenient manoeuvring or operation of the vehicle and/or for ease of mounting and dismounting or for monitoring side doors during mounting and dismounting of passengers, the seat position or the entire driver seat is displaceable, especially towards the vehicle sides and especially by a manual action. This enables an advantageous position to be achieved with respect to, in particular, the vehicle sides so as to permit monitoring in optimum manner and without great physical effort the exterior or vehicle side region conveniently in terms of travel and/or operation or for safety of persons inside or outside. In that case it is to be ensured that the driver seat can, after a positional change relative to the vehicle steering wheel or the travel direction, be guided in uncomplicated manner simply and quickly back into the original functional position behind the steering wheel. Moreover, it shall be ensured that a device of that kind can be produced in simple and economic manner and be able to be retrofitted conveniently, simply and economically to the above-mentioned vehicles.

It is known in vehicles to mount a driver seat to be rotatable for the purpose of mounting or dismounting or for sitting in a lateral or rearward working position. Driver seats which are exclusively rotatable enable a driver to rotate the seat, by his legs, out of the steering wheel region, but the physical spacing of the seat relative to the vehicle sides remains unchanged. A convenient lateral working position is not achievable by a rotatable seat.

There is thus a need for a seat which enables variation in the seating position of, for example, a vehicle driver and in which the disadvantages of the known, exclusively rotatable driver seats are eliminated. Preferably, the seat should be rotatable out of its orientation relative to the steering wheel and also the physical spacing, particularly towards the vehicle sides, should be conveniently changeable, especially reducible, in order to thereby achieve a convenient seating or working position for the seat occupant.

The change in seat position should be able to be carried out, without undue expenditure of force and/or movement, in a relatively simple manner in order to conveniently displace the position of the seat away from a steering wheel and back opposite the steering wheel or in order to conveniently displace the seat into another position opposite the steering wheel and/or towards the vehicle sides or a rear side of a seating compartment.

According to the present invention there is provided a device for diametral and radial variation in seating position, especially of the driver seat of vehicles, characterised in that an eccentric or crank transmission is operatively arranged between the driver seat and the chassis or cabin floor of a vehicle.

Preferably, the eccentric or crank transmission is constructed as an eccentric gearwheel transmission.

For preference, the eccentric or crank transmission is formed from a toothed segment, which is arranged in force-locking manner on a bearing pin to be non-rotatable relative to the chassis or cabin floor, and a second toothed segment standing in engagement with the toothed segment, wherein the toothed segment is arranged in force-locking manner on a rotatably mounted bearing pin, the bearing pin is connected at one end in force-locking manner with the seat base plate and the spacing between the two bearing pins is formed by a bearing bridge pivotably mounted on the bearing pins.

In one embodiment, the eccentric or crank transmission can be formed from two gearwheel transmissions, which lie in operative series with respect to one another, with the toothed segments and a stepless friction is effective between the toothed segments. One of the toothed segments can be constructed as a toothed segment with internal toothing and, for preference, be arranged in manner directly force-lockingly on the stationary toothed segment.

Expediently, at least one respective ball bearing is operatively arranged between the individual bearing pins and the bearing bridge. For preference, a mechanical brake is operatively arranged between the seat or the seat base plate and the cabin floor or the bearing pin.



The brake, with a stationary brake shoe and a pivotable brake disc, can be operatively arranged between the two bearing pins. In addition, the brake can be adjustable in the region of the brake shoe.

With advantage, the entire device is built up in modular manner in conformity with function and is coverable by means of a capsule-like cover hood

It is advantageous with this device that the eccentric or crank transmission operatively arranged between the driver seat, or the base plate thereof, and the point of fastening of the seat to a floor of the vehicle has the effect that the seat is not only rotatable, especially by means of a physical turning moment, out of its orientation relative to the steering wheel, but is also radially pivotable relative to its fastening. Thus, in the case of a pivot angle through about  $\pm 90^\circ$  with respect to the position of the steering wheel into a displaced setting, for example opposite a side of the vehicle, a seat position is achieved which may make it possible for the occupant, for example driver, to conveniently, and with clarity towards the respective vehicle side, operate the vehicle or bring the respective vehicle side fully into view. Moreover, the selected seat direction can be returned, by a small manual turning moment or a physical rotary action on the seat, back into position behind the steering wheel. In that case, the eccentric or crank transmission diametrically and radially guides the seat precisely back into the originally set position relative to the steering wheel.

The mode of construction and function of the device with an eccentric or crank transmission also ensures that, for creation of a free space between the front edge of the seat and a cabin side of the vehicle or a fixture providing a physical boundary at the side, the seat is radially pivotable and rotatable in steplessly adjustable manner with respect to the steering wheel.

It is possible that through a series connection of at least two eccentric or crank transmissions and an appropriate variation or adaptation of the translation ratio of the provided transmission, for example an eccentric gearwheel transmission, any radial seat pivotation and change of the seat angle relative to the steering wheel can be achievable as required. Thus, it is possible to achieve a radial seat pivotation by a rotation relative to the steering wheel of more than  $\pm 90^\circ$ , for example up to  $\pm 360^\circ$ . Such a transmission also makes it possible to rotate or pivot the driver seat infinitely to the right or to the left in order

to always guide the seat precisely back again into an appropriate position behind the steering wheel.

Advantageously the braking equipment, especially mechanical braking equipment, provided between the transmission is in the form of a disc brake, preferably an adjustable disc brake, by means of which the effective torque or moment of inertia of the device inclusive of the seat and occupant can be conveniently regulated or absorbed during diametral and radial variation of the seat.

A further advantage of the new device is the convenient modular construction of the whole, which may allow a simple, rational and economic retrofitting in a vehicle.

Embodiments of the present invention will now be more particularly described by way of example with reference to the accompanying drawings, in which:

- Fig. 1            is a schematic partly sectional view of part of an agricultural towing vehicle embodying the invention;
- Fig. 2            is a schematic view, to an enlarged scale, of a first form of variable position seat of the vehicle with a brake disposed underneath;
- Fig. 3            is a schematic plan view of an eccentric gearwheel transmission of the seat of Fig. 2, with a rotation and pivot angle of  $360^\circ$ ;
- Fig. 4            is a schematic sectional view of the mounting of a second form of variable position seat, with a rotation and pivot angle of  $\pm 90^\circ$  and with a brake disposed above; and
- Fig. 5            is a schematic plan view of an eccentric gearwheel transmission of the seat of Fig. 4, with a rotation and pivot angle of  $\pm 90^\circ$ .

Referring now to Figs. 1 and 2, there is shown part of an agricultural vehicle 1 with a wheel 2, driver cabin 3, steering wheel 4, cabin floor 5 and driver seat 6. The seat 6 is mounted on the floor 5 by a crank or eccentric gear mounting means which is constructed in

modular manner and arranged between a base plate 8 of the seat and the cabin floor 5. The mounting means is covered by a hood 7.

The mounting means comprises an axle pin 9 which is fixedly connected with the seat base plate 8 and on which is fixedly arranged a toothed segment 10. The toothed segment 10 is in engagement with a radially larger toothed segment 11, which is fixedly arranged on an axle pin 12. The pin 12 is directly fixed to the floor 5. However, the pin 12 can also be arranged on a plate-shaped fastening device 23 (Fig. 2) which is fixed to the floor 5. The mounting means further comprises a pivotable bearing bridge or arm 14, which is mounted at one end on the stationary pin 12, in particular by means of a ball bearing 13, and on which at the other end the pin 9 together with the toothed segment 10 is mounted, as well as the seat base plate 8 together with the driver seat 6, by means of a ball bearing 13.1.

In addition, a brake disc 15, in particular of segment shape, is similarly fixed to the pin 9. A brake shoe 16 co-operable with the disc is arranged below the disc on the bridge 14.

As is evident from Fig. 2, a further toothed segment 17 is rotatably mounted on the pin 9 between two coaxial coupling discs 18 disposed adjacent to one another. An internally toothed segment 19 is disposed in engagement with the segment 17 and is fastened to the stationary segment 11.

By means of the two eccentric gearwheel transmissions arranged in series as shown in Figs. 1 and 2 and as illustrated in schematic plan view in Fig. 3, it is possible to diametrically and radially pivot the driver seat 6 by more than  $\pm 90^\circ$ .

Fig. 3 shows the axle pin 12 fastened on a fastening device 23 or to the cabin floor 5, the toothed segment 11 arranged on the pin 12 to be non-rotatable, the bearing bridge 14 rotatably mounted on the pin 12, the axle pin 9 with the toothed segment 10 fixedly arranged thereon, the further toothed segment 17 rotatably arranged on the pin 9 coaxially with the segment 10 and operatively mounted between the two coupling discs 18 (not shown), and the internally toothed segment 19 engaging the segment 17 and fixedly fastened to the segment 11. In effect, for attainment of a diametral and radial variation in the angle of the seat position relative to the steering wheel 5 of up to  $360^\circ$ , two eccentric

transmissions operatively connected in series are used in the eccentric gearwheel mounting means illustrated in Figs. 1 to 3.

An embodiment in which the rotation and pivot angle of the seat base plate 8 amounts to maximally  $\pm 90^\circ$  is shown in Figs. 4 and 5. The mounting means again comprises an axle pin 12 fastened at one end to the cabin floor 5, a toothed segment 10 fixed to the pin 12, a brake shoe 16 arranged at one side - in this case the top - to be non-rotatable, an adjacent brake disc 15 fixed to the pin 9, a bearing bridge 14 which is pivotably mounted at one end on the pin 12 by means of a ball bearing 13 and on which at the other end the pin 9 is mounted by means of a ball bearing 13.1, and a toothed segment 10 fixed to the pin 9 and engaging the stationary toothed segment 11. Also shown are the seat base plate 8 and a cover hood 7 over the mounting means.

As is apparent from Fig. 5, the external toothing of the toothed segment 10 extends over about  $270^\circ$ . Thereagainst, the toothing of the toothed segment 11 extends over an angle of about  $60^\circ$ .

The translation ratio between the two toothed segments 10 and 11 of the eccentric gearwheel transmission shown in Figs. 4 and 5 is about 2.4 : 1. Any other translation ratio of the eccentric or crank transmission can be selected in accordance with the desired variation, or diametral and simultaneous radial variation, in the seat position.

It is also possible that the toothed segments 10, 11 and 17 mentioned can, if required, be replaced by full gearwheels.

Moreover, the bearing bridge 14 can be adapted in physical length and construction to the desired spacings of the axle pins 9 and 12 and/or to the design of vehicle cabin 3.

In addition, instead of an eccentric or crank transmission or the eccentric gearwheel transmission 10, a crank slide transmission can be used.

CLAIMS

1. A vehicle with a variable position seat, wherein the seat is mounted on support means in the vehicle by eccentric or crank gear or crank slide mounting means permitting diametral and radial variation of the position of the seat.
2. A vehicle as claimed in claim 1, wherein the mounting means is arranged to allow the seat to travel on a curved path about a first axis for displacement of the seat towards or away from a side of the vehicle and to cause the seat when travelling on the path to so rotate about a second axis spaced from the first axis that the orientation of the seat relative to the front of the vehicle is substantially unchanged or is changed in a predetermined manner.
3. A vehicle as claimed in claim 1 or claim 2, wherein the support means is the chassis of the vehicle or a floor of a cabin or compartment of the vehicle.
4. A vehicle as claimed in any one of the preceding claims, wherein the mounting means comprises a gearwheel transmission.
5. A vehicle as claimed in any one of the preceding claims, wherein the mounting means comprises a first axle pin fixed relative to the support means, a crank arm rotatably mounted on the first axle pin, a second axle pin fixed relative to the seat and rotatably mounted in the arm at a spacing from the first axle pin, a first toothed gear fixed relative to the first axle pin, and a second toothed gear fixed relative to the second axle pin and meshing with the first gear.
6. A vehicle as claimed in claim 5, wherein each of the first and second gears is a segment gear.
7. A vehicle as claimed in any one of the preceding claims, wherein the mounting means comprises two gearwheel transmissions operatively connected in series.
8. A vehicle as claimed in claim 7 when appended to claim 6, wherein the mounting means comprises a third toothed gear fixed relative to the first axle pin and a fourth toothed gear fixed relative to the second axle pin and meshing with the third gear.

9. A vehicle as claimed in claim 8, wherein each of the third and fourth gears is a segment gear.
10. A vehicle as claimed in claim 9, wherein the fourth gear is an internally toothed segment gear.
11. A vehicle as claimed in claim 9 or claim 10, wherein the third gear is fixedly mounted on the first gear.
12. A vehicle as claimed in any one of claims 5, 6 and 8 to 11, comprising a respective ball bearing arranged between the arm and each of the axle pins.
13. A vehicle as claimed in any one of the preceding claims, comprising braking means to brake movement of the seat.
14. A vehicle as claimed in claim 13 when appended to any one of claims 5, 6 and 8 to 12, wherein the braking means is operatively arranged between the support means or the first axle pin on the one hand and the seat or the second axle pin on the other hand.
15. A vehicle as claimed in claim 15, wherein the braking means is disposed between the axle pins and comprises a stationary brake shoe co-operable with a pivotable brake disc.
16. A vehicle as claimed in claim 15, wherein the braking means is adjustable in the region of the shoe.
17. A vehicle as claimed in any one of the preceding claims, wherein the mounting means is of modular construction.
18. A vehicle as claimed in any one of the preceding claims, comprising a cover covering the mounting means.
19. A vehicle as claimed in any one of the preceding claims, wherein the seat is the driver seat of the vehicle.

20. A vehicle with a variable position seat substantially as hereinbefore described with reference to the accompanying drawings.



INVESTOR IN PEOPLE

Application No: GB 9930827.2  
 Claims searched: All

Examiner: Richard Gregson  
 Date of search: 30 March 2000

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
 UK Cl (Ed.R): A4L (LCC, LCX, LAL) ; B7B BEXX  
 Int Cl (Ed.7): B60N (2/00, 2/02, 2/04, 2/14, 2/38) ; A61G (3/00, 3/02, 3/04)  
 Other: Online: EPODOC, WPI, JAPIO.

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2236476 A (BROTHERWOOD) - see diagrams in particular.	1,3,19
X	GB 1362490 A (HARVESTER) - see diagrams and page 3, lines 35-41 in particular.	1,2,3,5,19
X	WO 93/18318 A (WALLACE) - see diagrams and page 2 in particular.	1,2,3,4,12,19
X	US 4600239 A (GERSTEIN) - see diagrams and column 4, line 36 to column 6 line 13 in particular	1,3,4,19

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.